

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 124128	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. <b>PCT/AU00/00416</b>	International Filing Date ( <i>day/month/year</i> ) 5 May 2000	Priority Date ( <i>day/month/year</i> ) 5 May 1999
International Patent Classification (IPC) or national classification and IPC  Int. Cl. <sup>7</sup> A01N25/30, 25/02, 57/20		
Applicant  VICTORIAN CHEMICALS INTERNATIONAL PTY LTD et al		

..	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.																
2.	This REPORT consists of a total of 4 sheets, including this cover sheet.  <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).  These annexes consist of a total of 13 sheet(s).																
3.	This report contains indications relating to the following items: <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 5%;">I</td> <td><input checked="" type="checkbox"/> Basis of the report</td> </tr> <tr> <td>II</td> <td><input type="checkbox"/> Priority</td> </tr> <tr> <td>III</td> <td><input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td>IV</td> <td><input type="checkbox"/> Lack of unity of invention</td> </tr> <tr> <td>V</td> <td><input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td>VI</td> <td><input checked="" type="checkbox"/> Certain documents cited</td> </tr> <tr> <td>VII</td> <td><input type="checkbox"/> Certain defects in the international application</td> </tr> <tr> <td>VIII</td> <td><input type="checkbox"/> Certain observations on the international application</td> </tr> </table>	I	<input checked="" type="checkbox"/> Basis of the report	II	<input type="checkbox"/> Priority	III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	IV	<input type="checkbox"/> Lack of unity of invention	V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	VI	<input checked="" type="checkbox"/> Certain documents cited	VII	<input type="checkbox"/> Certain defects in the international application	VIII	<input type="checkbox"/> Certain observations on the international application
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Date of submission of the demand 27 November 2000	Date of completion of the report 23 February 2001
Name and mailing address of the IPEA/AU  AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer   <b>GAYE HOROBIN</b> Telephone No. (02) 6283 2069

**I. Basis of the report**

1. With regard to the elements of the international application:\*
- ☐ the international application as originally filed.
- ☒ the description, pages 7-23, as originally filed,  
pages , filed with the demand,  
pages 1-6a, received on 8 February 2001 with the letter of 8 February 2001
- ☒ the claims, pages , as originally filed,  
pages , as amended (together with any statement) under Article 19,  
pages , filed with the demand,  
pages 24-29, received on 8 February 2001 with the letter of 8 February 2001
- ☐ the drawings, pages , as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of
- ☐ the sequence listing part of the description:  
pages , as originally filed  
pages , filed with the demand  
pages , received on with the letter of
2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.  
These elements were available or furnished to this Authority in the following language which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims 1-33	YES
	Claims	NO
Inventive step (IS)	Claims 1-33	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-33	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)****NOVELTY(N), INVENTIVE STEP(IS)**

No citation or obvious combination of citations discloses all of the features of the claimed invention. In particular none of the citations discloses an adjuvant composition in the form of a homogenous liquid which contains a lipophilic solvent, a lipophobic plant nutrient and a cationic emulsifier.

**VI. Certain documents cited****1. Certain published documents (Rule 70.10)**

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date ( valid claim) (day/month/year)
WO 99/51099	14 October 1999	1 April 1999	3 April 1998

This document discloses a composition of a herbicide, a lipophilic solvent (page 10 line 25-page 11 line 5) and a cationic surfactant, which can be an ethoxylated alkyl amine (page 9 line 10 and page 10 line 6). The composition may also contain ammonium sulfate, which is a plant nutrient (page 11 line 9). This document does not disclose specifically that the adjuvant is in the form of a homogenous liquid.

**2. Non-written disclosures (Rule 70.9)**

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)
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## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE  
 in its capacity as elected Office

<b>Date of mailing</b> (day/month/year) 18 December 2000 (18.12.00)	
<b>International application No.</b> PCT/AU00/00416	<b>Applicant's or agent's file reference</b>
<b>International filing date</b> (day/month/year) 05 May 2000 (05.05.00)	<b>Priority date</b> (day/month/year) 05 May 1999 (05.05.99)
<b>Applicant</b> KILLICK, Robert, William et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
 27 November 2000 (27.11.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No.: (41-22) 740.14.35	Authorized officer  Charlotte ENGER  Telephone No.: (41-22) 338.83.38
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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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14

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- ☐ the sequence listing part of the description:  
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## Adjuvant Composition for Chemicals Used in Agriculture

### Field of the invention

The invention relates to an adjuvant for use with chemicals used in agriculture. More particularly, the adjuvant of the invention is particularly adapted for use with herbicides.

### Background of the invention

In this specification, where a document, act or item of knowledge is referred to or discussed, this reference or discussion is not to be taken as an admission that the document, act or item of knowledge or any combination thereof was at the priority date:

- (a) part of common general knowledge; or
- (b) known to be relevant to an attempt to solve any problem with which this specification is concerned.

Whilst the following discussion highlights the invention with relation to herbicides, it is believed that the same principles apply to other chemicals used in agriculture, such as, plant hormones, insecticides, crop desiccants or crop defoliant.

Farmers rotate the use of their fields to allow the fields to regain their fertility. This means that at any one time there will be fields with crops and fields left bare. The bare fields are said to be fallow fields.

Weeds will still grow on the fallow fields, and while they will not be competing with a crop for nutrients or space, if they are left alone they will produce many seeds which will germinate and be a problem when the field is again used for crops. As a result, the farmer will spray the fallow fields with herbicide to kill the weeds. Since there is no crop on fallow fields, a non-selective herbicide can be used, such as glyphosate. Non-selective herbicides can also be used to control weeds in cropping situations where the crop has either been bred or genetically modified to be resistant to the herbicide.

There is a growing trend to produce adjuvants to improve the efficacy of agrochemicals, including herbicides. For example, in Australian patent application number 62833/98, an adjuvant for use with herbicides, crop defoliant and desiccants is disclosed including esters of fatty acids and nonionic emulsifiers.

Glyphosate is the most widely used non-selective herbicide for both fallow and cropping situations worldwide. Currently, a farmer may prepare the glyphosate spray with several additives to improve its efficacy. For example, it is known to add ammonium salts to improve the efficacy of glyphosate. The reasons for this improvement are not well understood and it is a complicated area of chemical and botanical reactions. However, it is believed that some anions can minimize the deleterious effect of hard water on herbicidal performance and the ammonium cation provides nutrition for the plant which enhances the uptake and translocation of the herbicide by the plant. Wetting agents are also used to improve leaf coverage. Petroleum fractions or other lipophilic materials (hereinafter referred to as lipophilic solvents) are used, especially in the summer months, to keep the herbicide in liquid form as the herbicide will be ineffective once it dries on the foliage.

The farmer may combine all these additives with the herbicide when the tank mix is prepared but the farmer may not know whether these components are compatible with each other. Some additives or adjuvants can actually antagonise each other and decrease the activity of the agrochemical. It is also inconvenient since there are several components which must be bought, measured and combined.

Farmers are always looking for more efficacious and convenient ways to enhance the performance of active ingredients. They would also prefer to simply add one composition which they know will enhance the efficacy of the herbicide rather than deal with several components where the resultant effect is unknown.

### **Summary of the invention**

It was envisaged that incorporating ammonium salts into lipophilic solvent-based adjuvants would produce an adjuvant which provides active ingredient enhancement in several different ways. It was thought that the ammonium salts (a source of nitrogen) would enhance translocation through the fertilizer effects and could also increase leaf permeability, and the appropriate anion would reduce the effects of water hardness, whilst the lipophilic solvents would increase the availability of the active on the target and subsequently the absorption of the active into the target. However, preparing a stable homogeneous blend of lipophilic solvent with ammonium salts, particularly those which minimize the detrimental effects of hard water has not been easy to achieve

because such salts are not soluble in lipophilic solvents. Hence, evaluating such a product as an adjuvant has not been possible.

It has been found that a homogeneous blend which is stable within normal storage conditions can be made which includes lipophilic solvents and lipophobic plant nutrients (such as ammonium salts) using cationic emulsifiers as a coupling agent.

According to the invention, a homogeneous liquid adjuvant for use with a chemical used in agriculture is provided comprising:

- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients (such as ammonium salts of inorganic anions); and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers having cationic characteristics in acidic conditions and mixtures thereof;

wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

Preferably, the adjuvant comprises:

- (a) from 5 to 55% by weight of one or more lipophilic solvents;
- (b) from 1 to 30% by weight of one or more lipophobic plant nutrients (such as ammonium salts of inorganic anions); and
- (c) from 1 to 15% of a mixture of one or more cationic emulsifiers.

More preferably, the adjuvant comprises:

- (a) from 15 to 35% by weight of one or more lipophilic solvents;
- (b) from 5 to 25% by weight of one or more lipophobic plant nutrients (such as ammonium salts of inorganic anions); and
- (c) from 1 to 10% of a mixture of one or more cationic emulsifiers.

The above proportions are based on the dry weight of the plant nutrients and cationic emulsifiers. It is common for these products to be supplied in aqueous or other diluted

forms. It will be necessary to determine actual concentrations of these components prior to using these diluted products in a composition according to the invention.

The lipophilic solvents may be petroleum fractions, vegetable oils, synthetic triglycerides, alkyl esters of fatty acids, fatty alcohols, guerbet alcohols or any mixture thereof. Preferably, a petroleum fraction is used as it is more cost effective. More preferably, the petroleum fraction is a mineral oil. These mineral oils, for example, can be 70, 100 or 150 sec solvent neutral.

If alkyl esters of fatty acids are used then the alkyl moiety can be derived from the simple alcohols such as methyl-, ethyl-, butyl or propyl alcohols. There are innumerable variations of the esters of fatty acids which may be produced from the natural oils and fats such as lard, tallow and vegetable oils, such as canola, corn, sunflower and soyabean oils, or from specific blends produced by fatty acid manufacturers or from fatty acids produced by synthetic means.

The lipophobic plant nutrients include ammonium salts of inorganic anions (such as ammonium sulphate and phosphates) which are known to minimise the deleterious effects of hard water on herbicide performance. Preferably, the ammonium salt is ammonium sulphate. If an anhydrous ammonium salt is used then water may need to be added to the composition. However, if the ammonium salt is already in solution then additional water may not be necessary.

The term "cationic emulsifiers" is used to include emulsifiers which are commonly classified as cationic as well as those which exhibit cationic properties in acidic conditions. An example of an emulsifier which is commonly classified as cationic is a quaternary cationic emulsifier. Examples of emulsifiers which exhibit cationic properties in acidic conditions are fatty amines, amine oxides and amine ethoxylates. Amphoteric emulsifiers such as betaines may also exhibit such properties.

Preferably, the cationic emulsifiers are selected from dimethylcocoamine, dimethyl-laurylamine oxide, alkyltrimethylammonium chloride, alkyl dimethylbenzylammonium chloride, alkylpyridium chloride, alkylimidazolium chloride, or mixtures thereof. More preferably, the cationic emulsifier is selected from alkyltrimethylammonium chloride, dimethyl lauryl amine oxide or mixtures thereof.

Preferably, the adjuvant composition comprises other components to improve the form of the composition. These other components may be added to form a micro-emulsion. The other components may be selected from the group consisting of nonionic emulsifiers, co-solvents and mixtures thereof.

5 Preferably, the nonionic emulsifiers are alkyl polysaccharides, sorbate emulsifiers, alkyl bearing ethoxylates or fatty alkanolamides. Alkyl polysaccharides are sometimes called alkyl polyglucosides, alkyl glucosides or alkyl saccharides. The sorbate emulsifiers are sorbitan mono- (or sesqui-) esters of fatty acids and include sorbitan mono-oleate and sorbitan monolaurate. Preferably, the sorbate emulsifier is sorbitan mono-oleate. An  
10 example of a fatty alkanolamide is oleyldiethanolamide. The co-solvents include propylene glycol, 1,3-butanediol, hexylene glycol, polypropylene glycols and ethanol. Anionic emulsifiers may be added when compatible with the other components.

When mineral oils are used as the lipophilic solvent and ammonium sulphate is used as the plant nutrient, preferably, the composition comprises a cationic emulsifier, the following  
15 nonionic emulsifiers: alkylpolysaccharides, fatty alkanolamide and sorbitan mono-oleate or alcohol ethoxylate, as well as the following co-solvents: 1,3-butanediol and ethanol.

When esters of fatty acids are used as the lipophilic solvent, preferably, a mixture of at least two cationic emulsifiers are used. One of the cationic emulsifiers may be an amphoteric emulsifier acting as a cationic emulsifier. More preferably, the mixture of  
20 cationic emulsifiers comprises fatty quaternary ammonium chlorides or fatty amine oxides in conjunction with fatty alkyldimethylamine salts of simple organic acids. For example, the fatty alkyldimethylamine salts of simple organic acids could be cocodimethylamine or lauryldimethylamine with citric acid. Other simple organic acids include acetic, 2-ethylhexanoic acid, tartaric, maleic and lactic acid.

25 In another preferred form of the invention, the adjuvant for use with a chemical used in agriculture further comprises one or more other available adjuvant components. The adjuvant component may be selected from pH modifiers, spray drift retardants, stickers, rainfasteners and wetters.

According to another embodiment of the invention, there is provided an agrochemical composition comprising a chemical used in agriculture and an activity enhancing amount of a homogeneous liquid adjuvant, said homogeneous liquid adjuvant comprising:

- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- 5 (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients (such as ammonium salts of inorganic anions); and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which exhibit cationic characteristics in acidic conditions and mixtures thereof;
- 10 wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

According to a further embodiment of the invention, there is provided a homogeneous liquid adjuvant when used with a chemical used in agriculture comprising:

- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- 15 (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients (such as ammonium salts of inorganic anions); and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which exhibit cationic characteristics in acidic conditions and mixtures thereof;
- 20 wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

6a

According to an even further embodiment of the invention, there is provided a method for enhancing the activity of a chemical used in agriculture comprising the step of combining the chemical with a homogeneous liquid adjuvant comprising:

- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- 5 (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients (such as ammonium salts of inorganic anions); and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which exhibit cationic characteristics in acidic conditions and mixtures thereof;
- 10 wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

According to another embodiment of the invention, there is provided a method of treating vegetation comprising the step of applying an agrochemical composition comprising a chemical used in agriculture and a homogeneous liquid adjuvant comprising:

- 15 (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients (such as ammonium salts of inorganic anions); and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which
- 20 exhibit cationic characteristics in acidic conditions and mixtures thereof;

wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

### Examples

The invention will now be further explained and illustrated by the following non-limiting examples.

25

### Lipophilic solvents, cationic emulsifiers, plant nutrients and other components used



## THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A homogeneous liquid adjuvant for use with a chemical used in agriculture comprising:
  - (a) not in excess of about 75% by weight of one or more lipophilic solvents;
  - 5 (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients; and
  - (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers having cationic characteristics in acidic conditions and  
10 mixtures thereof;wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.
2. An adjuvant according to claim 1 comprising:
  - 15 (a) from 5 to 55 % by weight of one or more lipophilic solvents;
  - (b) from 1 to 30 % by weight of one or more lipophobic plant nutrients; and
  - (c) from 1 to 15% of a mixture of one or more cationic emulsifiers.
3. An adjuvant according to claim 2 comprising:
  - (a) from 15 to 35% by weight of one or more lipophilic solvents;
  - 20 (b) from 5 to 25% by weight of one or more lipophobic plant nutrients; and
  - (c) from 1 to 10% of a mixture of one or more cationic emulsifiers.
4. An adjuvant according to claim 1 wherein the lipophilic solvent is selected from the group consisting of petroleum fractions, vegetable oils, synthetic triglycerides, alkyl esters of fatty acids, fatty alcohols, guerbet alcohols or any mixture thereof.
- 25 5. An adjuvant according to claim 4 wherein the lipophilic solvent comprises a petroleum fraction.

6. An adjuvant according to claim 5 wherein the petroleum fraction is a mineral oil.
7. An adjuvant according to claim 4 wherein the lipophilic solvent comprises an alkyl ester of a fatty acid.
8. An adjuvant according to claim 7 wherein the fatty acid of the alkyl ester of a fatty  
5 acid has an alkyl moiety derived from the simple alcohols methanol, ethanol, propanol or butanol.
9. An adjuvant according to claim 7 wherein the alkyl ester of a fatty acid is derived from natural oils and fats, specific blends produced by fatty acid manufacturers or from fatty acids produced by synthetic means.
- 10 10. An adjuvant according to claim 9 wherein the natural oils and fats are selected from the group consisting of lard, tallow, vegetable oils and mixtures thereof.
11. An adjuvant according to claim 1 wherein the lipophobic plant nutrients comprise one or more ammonium salts of inorganic ions.
12. An adjuvant according to claim 11 wherein the ammonium salts of inorganic ions  
15 are selected from the group consisting of ammonium sulfate, ammonium phosphate and mixtures thereof.
13. An adjuvant according to claim 12 wherein the ammonium salt of inorganic ions is ammonium sulfate.
14. An adjuvant according to claim 1 wherein the cationic emulsifiers are selected from  
20 fatty amines, fatty amine oxides or mixtures thereof.
15. An adjuvant according to claim 1 wherein the cationic emulsifiers are quaternary cationic emulsifiers.
16. An adjuvant according to claim 1 wherein the cationic emulsifiers are selected from dimethylcocoamine, dimethylaurylamine oxide, alkyltrimethylammonium chloride,  
25 alkyl dimethylbenzylammonium chloride, alkylpyridium chloride, alkylimidazolium chloride, or mixtures thereof.

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17. An adjuvant according to claim 16 wherein the cationic emulsifiers are selected alkyltrimethylammonium chloride, dimethylaurylamine oxide or mixtures thereof.
18. An adjuvant according to any of the preceding claims further comprising one or more other components to improve the form of the composition.
- 5 19. An adjuvant according to claim 18 wherein the other component is selected from nonionic emulsifiers, co-solvents and mixtures thereof.
20. An adjuvant according to claim 18 wherein the other component is a mixture of one or more nonionic emulsifiers.
21. An adjuvant according to claim 19 wherein the nonionic emulsifiers are selected  
10 from the group consisting of alkyl polysaccharides, sorbate emulsifiers, alcohol ethoxylates, fatty alkanolamides or mixtures thereof.
22. An adjuvant according to claim 18 wherein the other component is a co-solvent.
23. An adjuvant according to claim 22 wherein the co-solvent is selected from the  
15 group consisting of propylene glycol, 1,3-butanediol, hexylene glycol, polypropylene glycols, ethanol or mixtures thereof.
24. An adjuvant according to claim 6 wherein the cationic emulsifiers are quaternary cationic emulsifiers.
25. An adjuvant according to claim 24 further comprising nonionic emulsifiers selected  
20 from the group consisting of alkylpolysaccharides, fatty alkanolamide, sorbitan monooleate, alcohol ethoxylate and mixtures thereof.
26. An adjuvant according to claim 24 further comprising co-solvents selected from the group consisting of 1,3-butanediol, ethanol and mixtures thereof.
27. An adjuvant according to claim 7 wherein at least two cationic emulsifiers are used.
28. An adjuvant according to claim 27 wherein the mixture of cationic emulsifiers  
25 comprises fatty quaternary ammonium chlorides and/or fatty amine oxides in conjunction with fatty alkyldimethylamine salts of simple organic acids.

29. An adjuvant according to any of the preceding claims further comprising one or more other available adjuvant components.
30. An agrochemical composition comprising a chemical used in agriculture and an activity enhancing amount of a homogeneous liquid adjuvant, said homogeneous liquid adjuvant comprising:
- 5
- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
  - (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients; and
  - (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which exhibit cationic characteristics in acidic conditions and mixtures thereof;
- 10

wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

15

31. A homogeneous liquid adjuvant when used with a chemical used in agriculture comprising:

- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients; and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which exhibit cationic characteristics in acidic conditions or mixtures thereof;

wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

32. A method for enhancing the activity of a chemical used in agriculture comprising the step of combining the chemical with a homogeneous liquid adjuvant comprising:

- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients; and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which exhibit cationic characteristics in acidic conditions and mixtures thereof;

wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.



33. A method of treating vegetation comprising the step of applying an agrochemical composition comprising a chemical used in agriculture and a homogeneous liquid adjuvant comprising:

- (a) not in excess of about 75% by weight of one or more lipophilic solvents;
- 5 (b) not in excess of about 50% by weight of one or more lipophobic plant nutrients; and
- (c) not in excess of about 50% of a mixture of one or more cationic emulsifiers selected from the group consisting of cationic emulsifiers, emulsifiers which exhibit cationic characteristics in acidic conditions and  
10 mixtures thereof;

wherein the cationic emulsifier acts as a coupling agent between the lipophilic solvent and the lipophobic plant nutrient to form a homogeneous liquid composition.

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/AU00/00416 (22) International Filing Date: 5 May 2000 (05.05.00) (30) Priority Data: PQ 0175 5 May 1999 (05.05.99) AU (71) Applicant (for all designated States except US): VICTORIAN CHEMICALS INTERNATIONAL PTY LTD [AU/AU]; 37-49 Appleton Street, Richmond, VIC 3121 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): KILLICK, Robert, William [AU/AU]; 14 Dallas Street, Mount Waverley, VIC 3149 (AU). KILLICK, Andrew, Robert [AU/AU]; 10 Park Street, Richmond, VIC 3121 (AU). JONES, Peter, William [AU/AU]; 65 Menzies Road, Menzies Creek, VIC 3159 (AU). WRIGLEY, Peter, Ronald [AU/AU]; 6 Handel Court, Blackburn, VIC 3130 (AU). MORRISON, John, David [AU/AU]; 6 Burwood Court, Thomastown, VIC 3074 (AU). (74) Agent: MCMASTER OBERIN ARTHUR ROBINSON & HEDDERWICKS; 530 Collins Street, Melbourne, VIC 3000 (AU).			(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published With international search report.
(54) Title: ADJUVANT COMPOSITION FOR CHEMICALS USED IN AGRICULTURE			
(57) Abstract  According to the invention an adjuvant for use with a chemical used in agriculture is provided comprising: (a) not in excess of about 75 % by weight of one or more lipophilic solvents; (b) not in excess of about 50 % by weight of one or more plant nutrients (e.g. ammonium salts of inorganic anions); and (c) not in excess of about 50 % of a mixture of one or more cationic emulsifiers including surfactants which exhibit cationic characteristic in acidic conditions.			

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU00/00416

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>												
Int. Cl. <sup>7</sup> : A01N 25/30, 25/02, 57/20												
According to International Patent Classification (IPC) or to both national classification and IPC												
<b>B. FIELDS SEARCHED</b>												
Minimum documentation searched (classification system followed by classification symbols) IPC: A01N 25/30, 25/02, 25/22, 57/-, 27/-												
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched												
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: IPC as above												
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>												
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
P,X	WO 99/51099 A (MONSANTO COMPANY) 14 October 1999 Pages 9-11	1-3, 11-13, 18-21, 25, 29-33										
X	EP 598 515 A (ISHIHARA SANGYO KAISHA LTD.) 25 May 1994 Page 6	1-5, 11, 12, 18-20, 22, 29-33										
Y	EP 598 404 A (KUMIAI CHEMICAL INDUSTRY CO.) 25 May 1994 Whole document	1-33										
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex												
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
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Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  GAYE HOROBIN Telephone No : (02) 6283 2069										

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/00416

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 97/00010 A (MONSANTO COMPANY) 3 January 1997 Whole document	1-33
Y	US 5 672 564 A (BASF AKTIENGESELLSCHAFT) 30 September 1997 Whole document	1-33
Y	EP 358 494 A (DOW CHEMICAL COMPANY LIMITED) 14 March 1990 Whole document	1-33
Y	EP 554 015 A (ISHIHARA SANGYO KAISHA, LTD.) 4 August 1993 Whole document	1-33

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
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EP	598515	BG	98226	BR	9304750	CN	1089431
		HU	65440	JP	6340509	MX	9307176
EP	598404	BR	9304763	CN	1086955	JP	6157209
		LT	1453	US	5436225	US	5510321
WO	97/00010	AU	63863/96	CA	2224364	EP	854676
		US	5663117				
US	5672564	AU	73835/94	WO	9501722	CA	2166475
		CN	1126422	DE	4322211	EP	707445
EP	358494	GB	8820886				
EP	554015	PL	297553	BR	9300297	CA	2087930
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		US	5411932	JP	6040823		
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